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ABSTRACT

The National Science Foundation (NSF) was created by Congress in 1950 to initiate and support basic scientific research and programs at all levels. The growing societal interest in science literacy and human resource development in the 1980's, particularly with respect to underrepresented populations such as women, minorities, and disabled persons, influenced funding priorities and allocations at NSF. While community colleges continue to enroll 50% of all first-time freshmen and 50% of all minorities in higher education, and play an important role in the training of science researchers and educators, they have not yet received a proportionate share of NSF funding. This is due primarily to the low submission rates of funding proposals from two-year institutions. Also, while 85% of 1991 NSF grants to community colleges were in response to proposals made to the Division of Undergraduate Education in the Directorate for Education and Human Resources (EHR), a number of other funding programs within the EHR are underutilized by two-year institutions, including the Instrumentation and Laboratory Improvement Program; the Undergraduate Faculty Enhancement Program; the Undergraduate Course and Curriculum Development Program; the Young Scholars Program; and the Private Sector Partnerships program. As part of its effort to increase the proposal submission rate of two-year colleges, NSF is increasing the number of community college faculty who serve as reviewers. For their part, community colleges can involve faculty in the solicitation of external funding and provide support for proposal writing activities. Data tables and specific examples of two-year college projects funded by NSF under each of the underutilized program areas are included. (PAA)

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"PARTNERS IN CHANGING MATH & SCIENCE EDUCATION: THE ROLE OF THE NATIONAL SCIENCE FOUNDATION, THE ROLE OF COMMUNITY COLLEGES"

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October 23, 1992

8:00 a.m.

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Thank you, Dr. Parilla. I'm happy to be here with you today, to share with you some activities that are going on at the National Science Foundation involving community colleges, some advances in communications technology with which community colleges are or should be involved, and express my views of the challenges and responsibilities facing community colleges as the Nation struggles to regain its technological supremacy in the world marketplace.

The NSF was founded after World War II, to continue the link between the scientific community and the federal government that had been forged during the war. Vannevar Bush, in his book *Science, the Endless Frontier* proposed the creation of the National Science Foundation to insure the health of science in the Nation and to continue the government--university partnership to insure technological advances during peacetime.

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The Foundation was established by Congress in 1950, with the charge "to initiate and support basic scientific research and programs to strengthen scientific research potential and science education programs at all levels in the mathematical, physical, medical, biological, social, and other sciences and to initiate and support research fundamental to the engineering process and programs to strengthen engineering research potential and engineering education programs at all levels..."

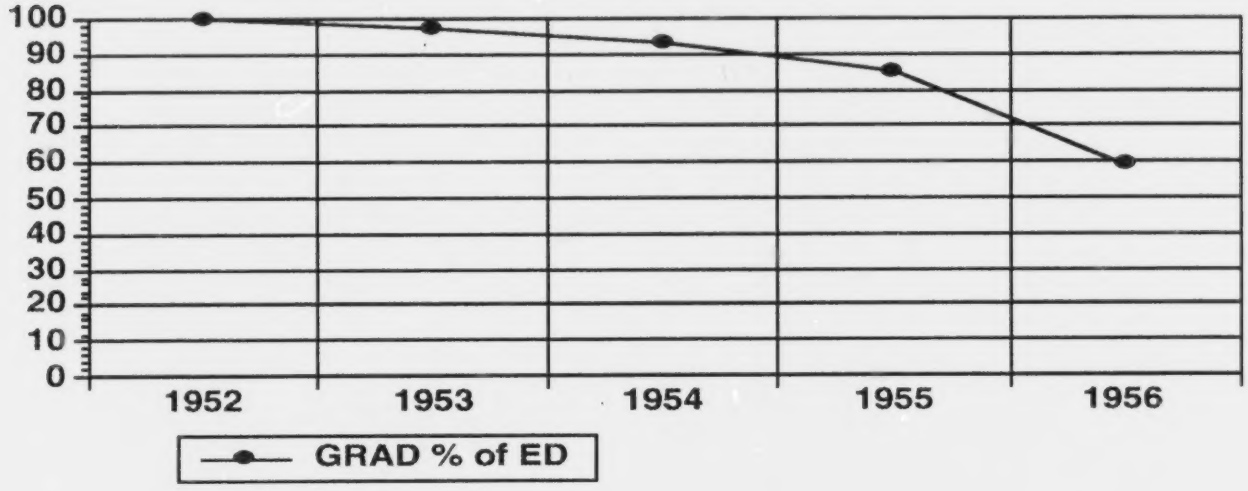
VG1--

to initiate and **support** ... programs to strengthen

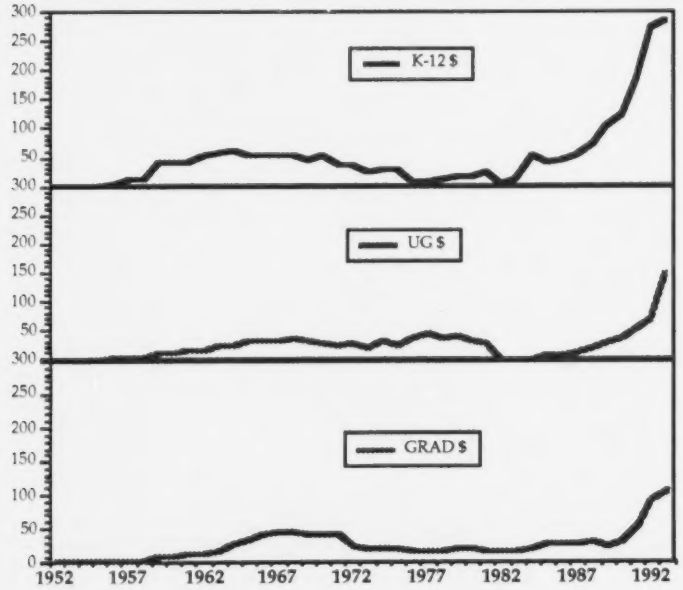
scientific research potential and

science education programs **at all levels ...**

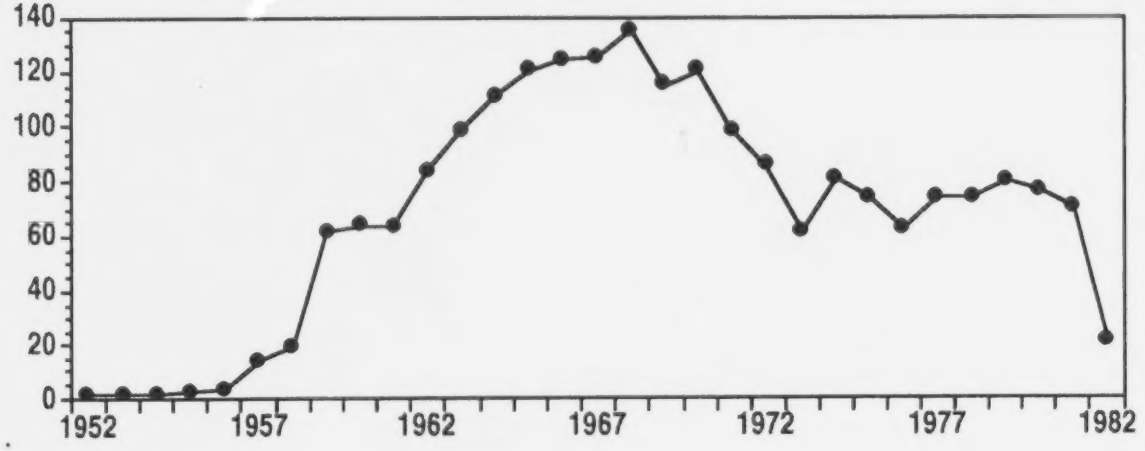
The early involvement of NSF with education was principally at the graduate level. This was probably appropriate, since the earliest mission of the agency related to basic research.



However, the launching of Sputnik occasioned the nation into a contest of technological supremacy. John Kennedy set as one of his goals the landing of a man on the moon by the end of the decade. Suddenly, a much larger talent pool of scientists and engineers was needed and the funding for all levels of science and engineering education, including undergraduate and precollege, increased.

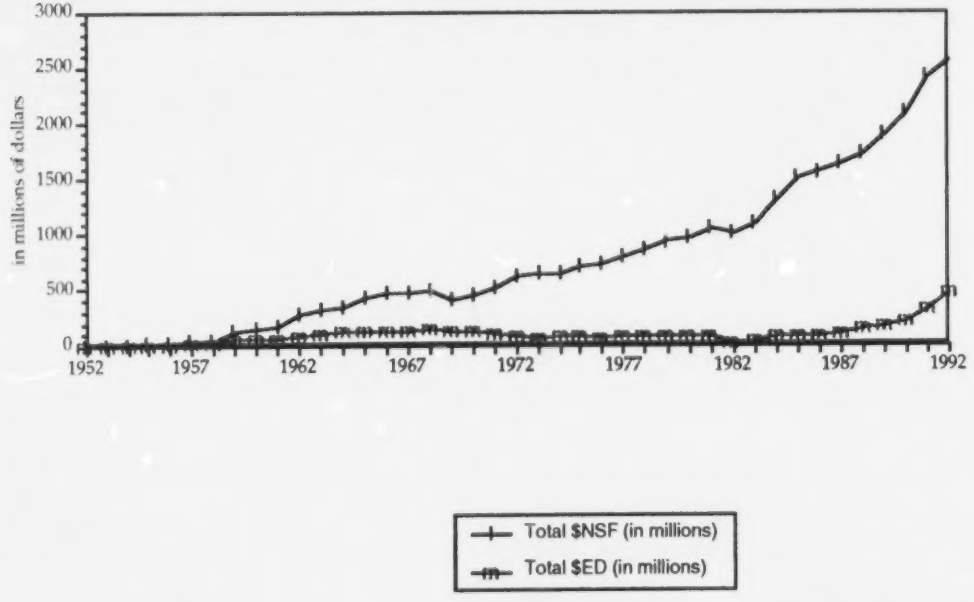


Although programmatic priorities shifted, the educational budget at the Foundation continued to increase through most of the sixties, and although reduced somewhat in the late sixties, it remained fairly constant throughout the seventies.



However, in 1982, in an effort to end the educational mission of NSF, by eliminating the science education budget , both for precollege and for undergraduate programs, the administration proposed cuts which plummeted the education budget from $80 million to $20 million, the lowest since the pre-Sputnik years.

In 1985, the document "A Nation At Risk" focused attention on the critical need for improved science and math education for the well-being of America, and since that time, funding for the Education and Human Resources Directorate at the Foundation, and indeed for the Foundation as a whole, has undergone substantial increases. This increase has been driven by earlier concerns about the S&E professional workforce and more recently by general societal interest in science literacy, human resource development as it bears on inadequately utilized populations (women, minorities and persons with disabilities) and the S&T workforce performance in a global technological enterprise



However, the community college system, one of the key players, from the late 1980's to the present EHR agenda, has been slow to get back into the game. The Foundation values the contributions made by community colleges to the Nation's educational enterprise. We know, for instance, that in the time when the Federal educational budgets were being level or even cut, community colleges enjoyed a tremendous growth in enrollment and in numbers of institutions.

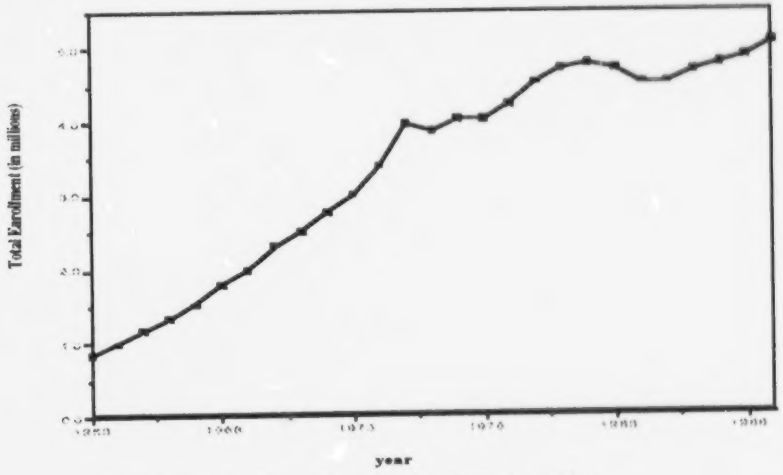


Fig. 1. Total enrollment in two-year colleges, 1963-1989.

Today they represent about 45% of the institutions of higher education; and enroll almost 40% of the nation's post-secondary education students, and 50% of all first-time freshmen.

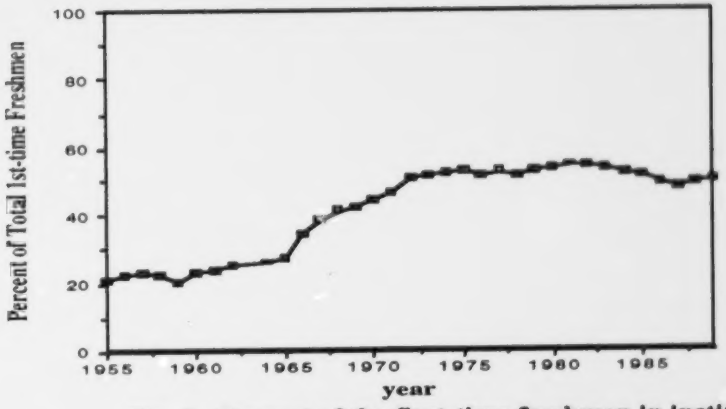


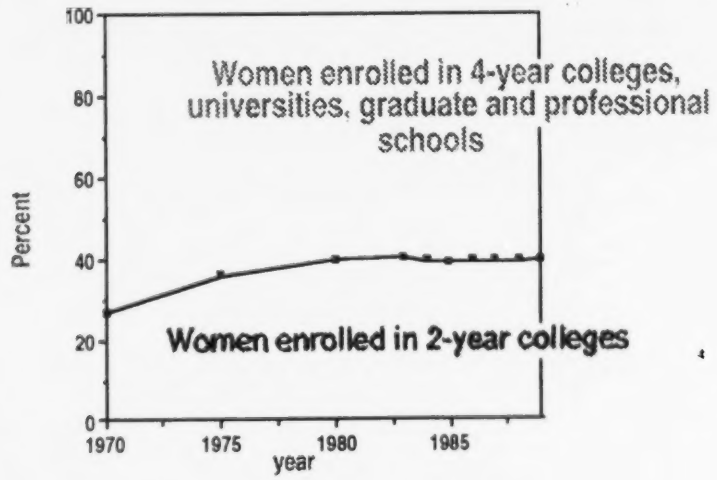
Fig. 3. Percent of the first-time freshmen in institutions of higher education who were enrolled in a two-year college, 1955-1989.

Community colleges serve a critical function among traditional and, more particularly, among non-traditional students. For example, 50% of all minorities in higher education today are enrolled in a two-year school.

Table 1. The numbers and percents of minority undergraduates in institutions of higher education who were enrolled in 2YCs in 1989.

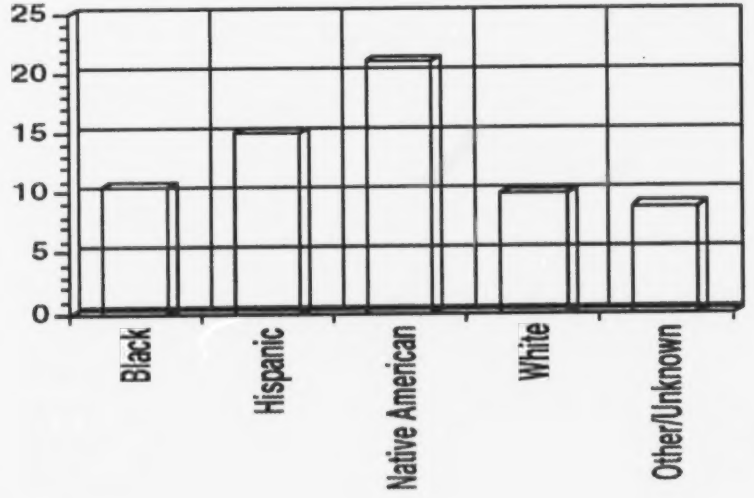
	NUMBERS in thousands	PERCENT of group enrollment
Total Minority Students	1106.9	50.5
Black	473.3	45.6
Hispanic	383.9	60.8
Asian/Pacific Islander	199.3	45.6
American Indian/Alaskan Native	50.4	58.7

Moreover, 40% of the women enrolled in higher education are in community colleges, as well as a significant proportion of older students.



According to studies conducted independently by the Department of Education and the National Science Foundation, as much as 17% of the recent BS degrees and 10% of the recent PhDs in SEM were awarded to students who attended classes in community colleges, numbers which are significantly higher for some ethnic minority students. And when we look at the impact community colleges have on the preparation of our future teaching workforce, we must note that in some systems, as many as 40% of the students who receive certification to teach in public schools took their science and math classes at community colleges.

Percentage of Recent Doctorates (1987-1991) Who Attended a Two-Year College

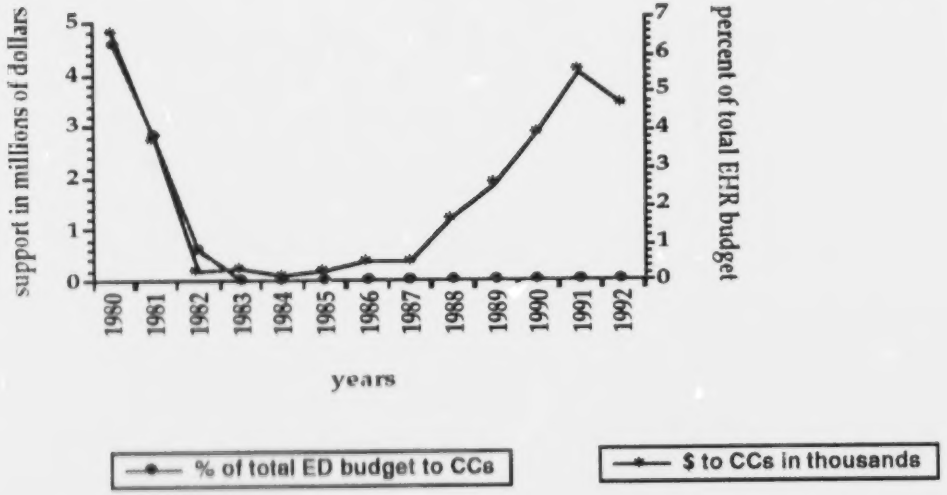


All of America's colleges and universities are called upon to respond to the needs of an ever-changing population and workplace but its two-year colleges are ideally positioned to serve as catalysts for improving the postsecondary education required to meet the demands of the levels and kinds of technical education now being required by industry. Increasingly, the two-year colleges play a significant role in the early collegiate training of higher level scientists and engineers because they address the educational needs of the whole of America's diverse population.

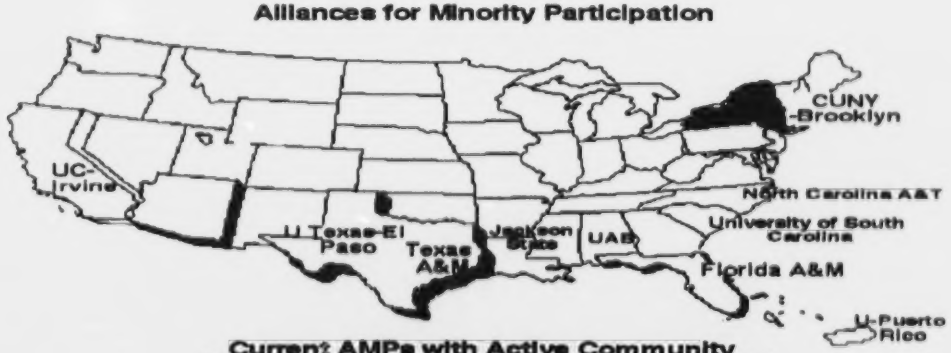
Although almost all of the Foundation's activities are open to competition to community colleges, most NSF funds are appropriated for the support of basic research, while the mission of community colleges is primarily instructional. In that light, community colleges, and indeed all educational institutions and programs, receive a slight proportion of NSF's total budget. In FY 1991 community colleges received about $3.35 million of support, down from a high of $4.74 million in 1989.

Why, then, do we find, as this slide shows, that, although the dollar amount of funding to community colleges is increasing to levels competitive with pre-1980s figures, the percentage of EHR's awards which go to community colleges remains almost negligible?

NSF support to Two-Year Colleges



Part of the reason is our system of bookkeeping at the Foundation, which records the type of institution which receives the funding, but not the level of professorate which benefits from the funding. By this bookkeeping system then, the Alliances for Minority Participation program official shows that $1 million is awarded to the Arizona State University AMP, but does not record the significant funding that is awarded to the Arizona community colleges which act as partners in this Alliance. As an aside, community colleges have been active partners in 7 of the 11 AMP awards that have been made. The same is true for many of the Comprehensive Regional Centers for Minorities, and the Statewide Systemic Initiatives--projects which have a significant level of community college involvement, and from which community colleges benefit both administratively and financially, but which do not show up in our data bases as awards to community colleges.



But a major reason for the low percentage of funding to community colleges is the low submission rates of proposals from community colleges, or from community college faculty. As the following slide shows

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VG of submission rates in ILI

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even in Instrumentation and Laboratory Improvement, by far the most popular of the programs at the Foundation for community colleges, the rate of proposal submission from community colleges is *one-tenth* that of the program overall. This in spite of the fact that ILI is an *undergraduate* program, which can directly benefit only undergraduate courses--and in spite of the very pertinent fact that community college proposals, as you can see from this slide, are quite competitive in this program.

Let me speak briefly about the structure of the Foundation, about programs at NSF of most interest to community colleges, and about mechanisms by which submission rates, and subsequently funding rates, can be increased from community colleges....

At present, most NSF funding of projects in two-year colleges is through programs of the Division of Undergraduate Education (DUE) in the Directorate for Education and Human Resources (EHR). Of 84 NSF grants to two-year colleges in FY 1991, 71 (85%) were made by EHR; of these 71, 60 were awards in programs administered by DUE.

The Foundation's education and human resources programs at the undergraduate level are designed to serve the needs of all collegiate institutions--two-year colleges as well as four-year colleges and universities. Moreover, many activities in other parts of my Directorate are such that community colleges should become more actively involved. I give you examples of some of these activities:

PROJECTS PARTICULARLY RECOMMENDED FOR COMMUNITY COLLEGE INVOLVEMENT

* DEVELOPMENT OF LABORATORY COMPONENTS
* FACULTY ENHANCEMENT AND TEACHER PREPARATION
* CURRICULUM AND INSTRUCTIONAL IMPROVEMENT
* YOUNG SCHOLARS
* PRIVATE SECTOR PARTNERSHIPS

Let me reiterate--there is an unacceptably low level of participation by community colleges in

any of these activities. However, all are areas in which community colleges have shown themselves to be extremely competitive.

Of the activities at the Foundation to which community colleges apply for funding, by far the most widely utilized program is EHR's Instrumentation and Laboratory Improvement Program.

VG of ILI

ILI funding stimulates important undergraduate curriculum and laboratory instructional improvements in science, engineering and mathematics, including computer science, for both majors and non-majors. To achieve this goal it makes grants for projects to enhance the quality of laboratory work through development of experiments and courses which use contemporary equipment and techniques, and helps leverage significant non-Federal resources. Substantial cost-sharing is required and provided by the awardee institutions from their own resources, private foundations, states, equipment manufacturers, and other elements of the private sector.

In FY 1990, 49 awards were made to two-year colleges through this program; in FY 1991, there were 52 awards. The typical ILI grant is relatively small by NSF standards, but the results are significant. Here are a few examples:

INSTRUMENTATION AND LABORATORY IMPROVEMENT

☆ HARRISBURG AREA COMMUNITY COLLEGE IN PENNSYLVANIA
- K CAD LABORATORY INCLUDES A NETWORK OF COMPUTER WORK STATIONS WHICH SUPPORT SOLIDS MODELING AND ANALYSIS SOFTWARE

☆ PARKLAND COLLEGE IN ILLINOIS
- K NEW METHODS FOR TEACHING THE NON-TRADITIONAL STUDENT AND INTEGRATING THE COMPUTER INTO ITS TECHNOLOGY PROGRAMS
- K PUTS THE STUDENT IN CONTROL OF A MULTI-MEDIA LEARNING ENVIRONMENT MATCHED TO LEARNING STYLES

☆ THE MONTGOMERY COUNTY COMMUNITY COLLEGE IN PENNSYLVANIA
- K COMPUTER LABORATORY WITH AN INTELLIGENT TUTORING SYSTEM FOR ALGEBRA

☆ THE SALISH KOOTENAI COLLEGE, ON THE FLATHEAD INDIAN RESERVATION
- K BIOLOGICAL SCIENCES PROJECT THAT INCLUDES INTERACTIVE AUDIOVISUAL MANUALS, HAND-HELD COMPUTERS, AND PCS
- K COMBINES STATE-OF-THE-ART TECHNOLOGIES WITH THE LEARNING STYLES OF NATIVE AMERICAN STUDENTS

- Harrisburg Area Community college in Pennsylvania is upgrading its CAD laboratory to

include a network of computer work stations which support solids modeling and analysis software. Students in the mechanical engineering technology and manufacturing and design technology programs study the concepts and techniques of interactive solids modeling using this equipment.

- Parkland College in Illinois is developing new methods for teaching the non-traditional student and integrating the computer into its electronic and computer systems technology programs. These work/test stations put the student in control of a multi-media learning environment that is being matched to their learning styles.

- The Montgomery County Community College in Pennsylvania developed a computer laboratory with an intelligent tutoring system for algebra, providing students with opportunities to conduct experiments with mathematics, the piloting of new materials, and faculty training.

- The Salish Kootenai College, a tribally controlled two-year college on the Flathead Indian Reservation, is developing a biological sciences project that includes interactive audiovisual manuals, hand-held computers which allow for data analysis in the field, and PCs in the lab

which interface with data acquisition equipment and provides immediate graphical analysis as students perform experiments. This program is especially significant because it combines state-of-the-art technologies with the learning styles of Native American students.

As I mentioned previously, our ILI program commands the greatest attention from the community college SME faculty. However, other programmatic activities are available, and indeed have already proven themselves beneficial to community college faculty. One of the principal programs to which I allude, is the **Undergraduate Faculty Enhancement Program**.

There is demonstrated need for activities which will enable faculty to remain intellectually vigorous, current in their disciplines, award of up-to-date curricular developments, and prepared to stimulate student learning. This need exists for faculty at all kinds of collegiate institutions--research universities, and community and other primarily undergraduate colleges. Faculty cannot gain currency in their disciplines through "one-shot" activities, continuing participation in a community of scholars/teachers is required. Similarly, widespread improvement of instruction and curriculum will not be achieved through the successful marketing and adoption of the work of a few reformers; support must be provided to faculty

members all across the nation for individual and local improvement efforts.

Few two-year colleges have received awards to support UFE projects, but many UFE grants to universities and other organizations are designed for the benefit of two-year college faculty--who account for 20% of all faculty served by UFE.

I give you examples of UFE projects designed expressly by or for community college faculty:

UFE PROJECTS DESIGNED EXPRESSLY BY OR FOR COMMUNITY COLLEGE FACULTY

- ☆ PRINCE GEORGE'S COMMUNITY COLLEGE OF LARGO, MD
  - K SIX-DAY WORKSHOP FOR COMMUNITY COLLEGE FACULTY TO LEARN ABOUT THE CHESAPEAKE BAY ECOLOGY
- ☆ SINCLAIR COMMUNITY COLLEGE, DAYTON, OH,
  - K TWO-WEEK WORKSHOPS FOR 36 COMMUNITY COLLEGE FACULTY
  - K EXPLORE MODERN CHEMICAL INSTRUMENTAL TECHNIQUES AND THEIR APPLICATIONS IN INTRODUCTORY COURSES
- ☆ WESTERN WASHINGTON UNIVERSITY, BELLINGHAM, WA
  - K FIVE-DAY WORKSHOP FOR COMMUNITY COLLEGE CHEMISTRY FACULTY FROM THE STATE OF WASHINGTON
  - K INVESTIGATE INNOVATIVE USES OF INSTRUMENTATION AND COMPUTERS IN INTRODUCTORY CLASSES AND LABORATORIES
  - K A PROPOSAL DEVELOPMENT SESSION
- ☆ NSF/AACC FELLOWS PROGRAM

- Prince George's Community College of Largo, MD, conducted a six-day workshop for community college faculty to learn about the Chesapeake Bay ecology at the University of Maryland Chesapeake Bay Biological Laboratory. lectures, field work and

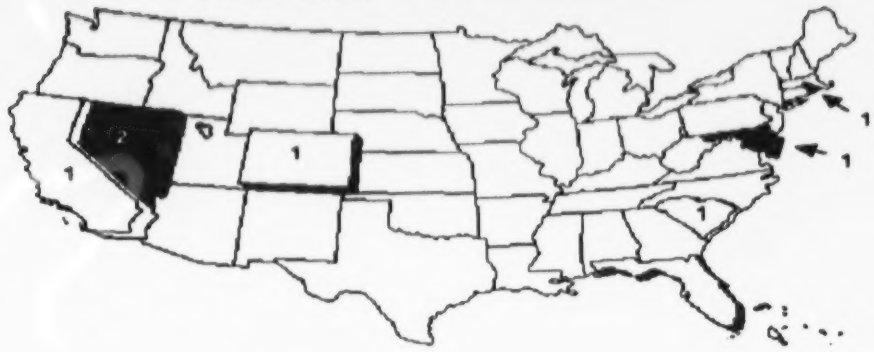
laboratory work were included.

- Sinclair Community College of Dayton, OH, acting as lead institution for a two-year and four-year college coalition, conducted two-week workshops for 36 community college faculty to explore modern chemical instrumental techniques and their applications in introductory courses.

- Western Washington University, in Bellingham, WA, conducted a five-day workshop for community college chemistry faculty from the state of Washington, to investigate innovative uses of instrumentation and computers in introductory classes and laboratories; as part of the workshop, a proposal development session was presented by NSF/AACC Fellows. The networking opportunities were so great in this activity that the community college faculty have developed, independently of the workshop, a follow-up session to explore a variety of pre-proposals, with the view of development and submission of projects to NSF from the newly-formed community college faculty alliance.

- And you must allow me to boast just a little of a very successful UFE project which has directly benefited not only community college faculty, but the National Science Foundation as well.

THE NSF/AACC FELLOWS PROGRAM



This is a project awarded to the American Association of Community and Junior Colleges, to identify and select national leaders among community college science and mathematics faculty, and provide them with fellowships which allow them to work at our offices in Washington, side-by-side with program officers and other Foundation staff, to learn about integral aspects of the proposal processing system, to provide advice and direction to the Foundation in its efforts to more adequately address the needs of community college students and faculty, and, through extensive outreach activities, disseminate the information they have gained to their colleagues across the country.

To date, 8 community college faculty have participated in this program, which was initiated a little over a year ago--3 chemists, 3 mathematicians, 1 biologist and 1 technical program specialist. These individuals have contributed vastly to our understanding of the issues which prevent the full involvement of community colleges in the programmatic activities of the Foundation, and have helped guide our efforts to develop mechanisms which will reduce or remove these barriers.

Undergraduate Course and Curriculum Development

NSF has three undergraduate course and curriculum programs. One focuses on instruction in the calculus, and another on the engineering curriculum (it was merged recently into the Engineering Education Coalitions Program); these have been running since 1988. The third one is new: Undergraduate Course and Curriculum Development Program (UCC) in engineering, mathematics, and the sciences.

The UCC Program provides support for the design, development and testing of major changes intended to increase to effectiveness and efficiency of undergraduate courses, curricula, and attendant laboratories in engineering, mathematics, and the sciences. Emphases are placed on timely applications of new knowledge and technologies; re-thinking professional and preprofessional curricula; courses for nonscientists; articulation with high school science and mathematics; and involvement of research-oriented faculty.

There is need for a variety of projects, large and small, to stimulate faculty efforts that will yield new undergraduate courses and curricula. In this area, the Foundation will emphasize: re-thinking professional an pre-professional curricula; courses for nonscientists; timely applications

of new knowledge and technologies; involvement of research-oriented faculty; and two critical articulations -- high school with college, and two-year institutions with four-year.

All UCC projects that are targeted on the first two years of college work benefit two-year college programming regardless of where they are conducted. Recently, faculty members of two-year colleges have begun to submit proposals to the UCC Program. The following are examples drawn from the FY 1990 and FY 1991 competitions:

UCC projects submitted by community college faculty

- **Joliet Junior College in Illinois**
  - **one-year pilot program for experienced community college physics teachers**
  - **hands-on workshops are planned to foster the approach of using microcomputer-based laboratories, conceptual exercises, and overview case studies**
- **Union County Community College in New Jersey**
  - **implement a calculator-based calculus curriculum at five community colleges**
- **Suffolk Community College in New York**
  - **consortium of schools including Harvard University, the University of Arizona, Colgate University, Haverford College**
  - **investigating the use of calculators and computers in teaching calculus**

- Joliet Junior College in Illinois will conduct a one-year pilot program for

experienced community college physics teachers. Hands-on workshops are planned to foster the approach of using microcomputer-based laboratories, conceptual exercises, and overview case studies. The main goal of the project is to encourage participant teachers to adapt or develop a stronger understanding of physics concepts.

- Union County Community College in New Jersey received a grant to implement a calculator-based calculus curriculum at five community colleges.

- Suffolk Community College in New York is part of a consortium of schools including Harvard University, the University of Arizona, Colgate University, Haverford College, and other who are investigating the use of calculator and computers in opening up new topics in and new ways of teaching calculus. Emphasis in the lessons is on the "Rule of Three". When possible calculus topics should be investigated from a numerical, graphical and algebraic standpoint.

Young Scholars

The Young Scholars Program offers funding for hands-on enrichment activities in science, mathematics, and engineering for high-potential or high-ability secondary schools students, to stimulate and strengthen their interest in mathematics, science, and engineering careers, and to help them maintain academic options. The program seeks participation of all groups in its projects. The program was initiated in FY 1988 and is administered by EHR's Division of Elementary, Secondry and Informal Education. In FY 1990, over 4500 young men and women participated in Young Scholars projects:

- Cuyhoga Community College in Cleveland conducted a project consisting of enrichment activities based on the "Teaching Integrated Math and Science" curriculum, research projects led by university faculty and NASA engineers and scientists, and industrial tours. This program was jointly funded by NSF, NASA, and the Ohio Board of Regents for students in grades 7 and 8. Emphasis was on participation by girls, minorities, and economically disadvantaged.

- Northwest College in Wyoming led a program in Yellowstone National Park for

students entering Grade 12. Students were exposed to various aquatic field and laboratory research paradigms, designing and choosing appropriate research methodologies as they designed and carried out an environmental study of the Gibbon River. There was an emphasis on participation by Native American students of the Rocky Mountain Region. The study also provided useful data to Yellowstone National Park research offices.

Private Sector Partnerships

The Private Sector Partnerships program (PSP) is designed to foster use of the intellectual capital of business and industry in addressing the manifold needs of K-12 science and mathematics education in partnerships with large urban schools, school districts, and regional consortia. PSP projects exemplify a variety of new kinds of collaboration. The following are examples of PSP awards to two-year institutions:

- Alabama Aviation and Technical College and Northwest Airlines in partnership are developing a program to support the improvement of mathematics education in aviation

technology programs. The goals of the project are to strengthen the mathematics component of the aviation technology programs offered at the school by the design, development, pilot-testing, and revision of three new courses in collaboration with avionics engineers and by exposing students in their avionics programs to the real workplace. Special emphasis in the program is on increasing the opportunities for women and minorities in aviation technical education.

- At Lewis and Clark Community College in Illinois the project "Math, Science, and Technology Education for Riverbend in the 90s" aims to enhance math and science education for non-baccalaureate bound students in community college preparatory programs and career programs in grades 6-12. The project will help prepare students for technical careers. Current applications of science and mathematics will be integrated into the curricula.

- Harry S. Truman College of the City Colleges of Chicago is conducting a project for Biotechnician Training. This project will develop a two-year curriculum leading to an

associate degree in technology, prepare students for employment as biotechnicians, and increase the representation of minority and disadvantaged populations in science and math technology. Harry Truman College also has a Young Scholars Program using the topic of Chicago as an ecosystem designed to acquaint inner city youth with the technical systems in the community.

But I stress again--community colleges are not participating as fully as they might, in the funding available from the National Science Foundation. And to increase this participation, all of us in this room have a responsibility, a part to play.

What can NSF do about increasing the submission rate of community colleges to its programs?

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1. We are bringing in more two-year college SME faculty to serve as reviewers

2. We are encouraging collaboratives formed between business and industry, 4 year colleges and universities, and community colleges

3. We are taking a critical look at program announcements and publications to see if the wording precludes or seems to indicate lack of community college participation.

4. Our AACC Fellows program has done a superlative outreach activity; we intend to continue this program

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- We are bringing in more two-year college SME faculty to serve as reviewers. One of the best ways to educate people about the proposal review and processing activities is to allow them to see the activities close up, to participate in the process with their colleagues from other types of institutions of higher education, to see what makes a good proposal, to hear the in-depth discussion that surrounds the fate of each proposal sent to the Foundation. This is an excellent opportunity also for community college faculty to educate their colleagues at other institutions as to the mission and the purpose of community colleges, to see up close the dedication to quality lower-division education that community college faculty bring to their classrooms and their laboratories, and to their students.

- We are encouraging collaboratives formed between business and industry, 4 year colleges

and universities, and community colleges. Community colleges are uniquely situated in the academic community to provide leadership, guidance, expertise, and service to their sister educational institutions, both public schools and higher education. Moreover, community colleges and their faculty have their fingers on the pulse of the community, to interact with local business leaders, to understand the skills with which potential employees should enter the job market, and those which current employees should be upgraded to; and to adapt classrooms, schedules, curricula, and teaching styles to provide those skills.

- At NSF, we are taking a critical look at program announcements and publications to see if the wording precludes or seems to discourage community college participation. Our staff is actively involved in learning and disseminating information about the community college mission, within the Foundation, to Congress and other Federal funding agencies with whom we interact, and to the various members of the scientific and educational communities. We at the Foundation realize that to improve SEM education in this country is a *cooperative* endeavor, with all players working together, and understanding each other is a major step in that direction.

- And finally, our AACC Fellows program has done a superlative outreach activity. The 7 SEM community college faculty who have participated in this fellowship to date have provided a valuable service in terms of helping NSF understand the community college and the barriers which their faculty face, and they have, through their extensive outreach efforts, provided a bridge of understanding between community college faculty and the Foundation. We are very pleased with the results that have been produced in so short a period of time, and we fully intend to continue this commendable and highly effective program

What can community college administration do about the level of involvement of community college in the competitive funding process?

VG---

1. Involve faculty in the solicitation of external funding
2. Provide support for proposal writing activities
3. Provide support for professional development activities
4. Continue to encourage the uniqueness of community college faculty

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- Administration can involve faculty in the solicitation of external funding. No, let me rephrase that. Administration can become involved *with faculty* in the solicitation of external funding. All too often at the Foundation, and our AACC Fellows say that this is true in the field also, we see upper-level administrators accompanied by their grants officers, and far too seldom by their faculty. At the Proposal Development Workshops given by our Fellows, the attendees are often faculty or administrators, but seldom both at the same session.

- Administration can provide support to their faculty for proposal writing activities. All too often, administrators tell me that in tight budget years, they simply cannot afford to provide release time, or summer stipends to faculty for proposal development. I maintain that, especially in these times, you cannot afford not to. One of the Fellows related a story she heard from a community college physics professor at a small rural school. His college provided him with $1000 summer stipend to develop an ILI proposal. This proposal was successful, and brought in a $14,000 award to the college. That in itself is a very good return on the original investment. But having one successful attempt at writing a small proposal, the same physics instructor developed a Course and Curriculum Project proposal, which is a program in which

the needs addressed are just as critical as those in ILI, the funding level is typically higher, and the impact on science curricula is potentially more comprehensive. I say again, with such payoffs, you cannot afford not to support your faculty in these activities.

- Administration can provide support to their faculty for professional development activities; by this I mean that faculty should be supported and encouraged to become involved in the broad context of their discipline-based professional societies, which can provide a substantially larger resource base for proposal development activities, which is needed to overcome the low submission rate; faculty should be encouraged to enter the reviewer data bases for NSF and for other federal funding agencies, in order to expand their horizons and also their sphere of influence; faculty should be made cognizant of access to matching funds, through the educational infrastructure, through college trustees and foundation activities, through local and national business and industry ventures, and through private foundations and other federal agencies.

- Administration should continue to encourage the uniqueness of community college faculty,

by which I mean that the leaders should tear down and smooth away any barriers that exist to the development and maintenance of innovative curricular, scheduling, and teaching techniques that have sustained the phenomenal growth and acceptance that your institutions have enjoyed in America's academic community in this century--and that undoubtedly await you in the very near future, as the Nation strives to regain its competitive technological and scientific base in the world marketplace.

And finally, what can NSF do to increase the involvement of community colleges in our policy activities?

VG---

1. Matching Actions and Challenges
2. Two-Year College and Professional Society Workshop
3. The Scientific and Advanced Technology Act of 1992

In May, 1991, EHR hosted a national workshop on Science, Engineering and Mathematics Education in Two-Year Colleges. The report of that workshop, entitled Matching Actions and

Challenges, provided specific recommendations to community college faculty, to professional organizations, to community college presidents and administrators and to a variety of non-federal organizations.

One of the specific recommendations of this report was to professional societies, to become more involved in lower-division science, engineering and mathematics curricula, and that they develop programs which address the needs of community college faculty and students. In order to facilitate this, NSF is hosting a workshop next week, in which representatives from major professional societies and faculty leaders from the two-year community can meet and provide direction for the accomplishment of this recommendation.

The Scientific and Advanced Technology Act of 1992 passed the Senate on October 2. It is an authorization bill which provides for the National Science Foundation to become involved in technical education programs in the Nation. The specific purposes of the Act are:

VG-- 1. Improve science and technical education at associate-degree-granting colleges

2. Improve secondary school and post-secondary curricula in mathematics and science

3. Improve the educational opportunities of postsecondary students by creating comprehensive articulation agreements and planning between 2-year and 4-year institutions

4. Promote outreach to secondary schools to improve mathematics and science instruction

The Act contains two major funding activities:

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1. The National Advanced Scientific and Technical Education Program

2. National Centers of Scientific and Technical Education

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1. The National Advanced Scientific and Technical Education Program, which is designed to strengthen advanced technology education on a local level, by such activities as the development of model instructional programs and materials; professional development of full- and part-time faculty; and innovative public and private sector partnerships between 2-year colleges and business and industry, secondary schools, and other institutions of higher education.

2. Ten National Centers of Scientific and Technical Education, which will provide exceptional curricular offerings in advanced technology fields or in mathematics and science.

These must of course have a regional, state, or national impact.

Moreover, the Act authorizes the Director to appoint an officer of the Foundation to act as liason between the Foundation and community colleges, in order that the Foundation may better address the needs of the community colleges and advanced technology education.

CONCLUSION

I end my remarks to you today with a challenge---

---I challenge you all to remain continually aware that, along with recognition of your excellence by the educational and governmental arena, comes responsibility--the responsibility

to maintain that excellence, by upgrading your programs, by increasing your resource base, by acknowledging your strengths and taking measures to further strengthen them.

---I challenge you to recognize the talent, the promise, the dedication of your science and math faculty; and to foster that talent by establishing mechanisms, funding and reward systems to encourage the professional development of your faculty.

---I challenge you to never rest on your laurels as providing superior science, engineering and mathematics education at the lower division, but to continually improve the product you give to America's students.

---And I challenge you to guide the National Science Foundation to provide the leadership necessary to help you meet these challenges.

At NSF, we know the role the community colleges play in the education of the American people. You are the bright stars in the educational galaxy. NSF is committed to helping you shine as brightly as you should.